REMARKS

Status of the Claims

- Claims 1-10 are pending in the Application after entry of this amendment.
- Claims 1-10 are rejected by Examiner.
- Claims 1, 3, 5, and 7 are amended by Applicant.

Claim Rejections Pursuant to 35 U.S.C. §103

Claims 1, 2, 5, 6, 9, and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2003/0169804 to Kudumakis et al. (Kudumakis) in view of U.S. Patent No. 5,319,735 to Preuss et al. (Preuss). Applicant respectfully traverses the rejection.

Kudumakis discusses insertion of a code into an input audio stream such that the inserted code is inaudible in the composite of the audio stream and the inserted code. The code is inserted into the audio stream at locations where the audio stream is notch filtered to accept the code. Kudumakis operates on a frame by frame basis, inspecting the individual frequency bands within a single frame of audio input data. In the method of Kudumakis, only a single frame is considered. A frame has multiple bands, and Kudumakis operates on bands within a single selected frame. As stated in Kudumakis at paragraph 0021:

"The input audio signal is digitized and processed in frames. *Once a frame* of samples has been assembled, the notch frequency selection criterion is applied to determine the position of the notch frequencies. The function of the criterion is illustrated in FIG. 2. A frequency analysis technique, e.g. FFT, is applied to generate a set of spectral coefficients. The spectral coefficients are grouped to form frequency bands of approximate width 0.6-0.7 kHz. The energy content of *each band* is calculated from the corresponding spectral coefficients. The band with the maximum energy content is found. This process up to here can use part of the psycho-acoustic modeling performed by an MPEG encoder. *The notch frequencies are placed in one of the two neighboring bands*, as illustrated in the flow diagram of FIG. 2. This Figure shows that when the band with maximum energy in it is determined (B.sub.max' the code is either placed in

the nearest neighbour band B.sub.max+1 if the energy peak is narrower than some threshold value, or placed in the second nearest neighbour band B.sub.max+2 if the energy peak is broad." (Kudumakis, paragraph 0021)

Thus, Kudumakis teaches that an input audio signal is processed one frame at a time, where there are multiple frequency bands in the single frame. Kudumakis only operates in a single frame, not adjacent frames. In Kudumakis, notch frequencies are determined and the notch frequencies are placed in *neighboring frequency bands within the single frame*.

With the understanding that the Kudumakis only operates in one frame, it becomes clear that the present claims are distinguished from Kudumakis because the present claims recite operations occurring in a frame following the current frame. Whereas Kudumakis discusses limiting operations in a single frame, the current claims operate over adjacent frames. This operation of the current claims is not taught or suggested to one of skill in the art because Kudumakis limits operations to a single frame as expressly stated in Kudumakis paragraph 0021 stating: "Once a frame of samples has been assembled…"

Applicant respectfully submits that Paragraph [0021] of Kudumakis deals with frequency bands within a current frame only. Such frame represents frequencies which all stem from the same time instant. (i.e., Kudumarkis searches within a current frame in frequency direction for notch filter positions). Pending Claim 1 deals with determining notch filter positions in temporal and frequency direction outside the current frame, i.e. in the frame temporally following the current frame.

Applicant respectfully submits that one of skill in the art would understand that a 'band' is related to frequency whereas a 'frame' is related to time. Figures 2 and 3 of the present application show the frequency in the vertical direction and time in the horizontal direction.

Considering that Kudumarkis is clear in operating within only one frame, whereas the currently pending claims operate across adjacent frames, then Applicant respectfully submits that the Claim 1 feature of "*wherein, in the frame following said current frame, no watermark signal carrier is transmitted in the frequency band or bands which have been occupied in said current frame*" is not taught or suggested by Kudumakis. Applicant notes that Kudumakis does not discuss the content of the frame following the current frame and also does not

discuss excluding watermark signal carriers in frequency bands in the next frame that are occupied by the current frame as recited in pending Claim 1.

On page 2 of the current Office Action, Applicant respectfully disagrees with some arguments concerning applying Kudumakis to the current claims. In the abstract of Kudumakis, the locations vary with the frequency content of the signal (i.e., the watermark frequency band locations within the following frame are not controlled by the watermark frequency band locations within the current frame because the frequency content of an audio signal frame is incidental). Thus, one of skill in skill in the art would understand that if the frequency content of the following frame is similar to the frequency content of the current frame (which is quite normal in nearly stationary sections of the audio signal), the watermark frequency band locations within the following frame will be the same as in the current frame.

Regarding the Examiner's arguments on using an offset controlled by a random number generator, the following is to be kept in mind.
Within the available audio frequency range, frequency bands of 0.6-0.7 kHz bandwidth are formed in Kudumakis, wherein very likely there is some 'safe space' between these frequency bands because filters forming such frequency band will have a limited steepness.

This means that only a very limited maximum number (e.g. 10 or 15) of candidate frequency ranges is available within the total audio frequency range available for such purposes. A suitable random offset generator can therefore produce an even more limited number of offset values only (makes sense only in case they are smaller than 10 or 15, respectively), thereby including not only rarely the offset value 'zero frequency band distance' (i.e., even by using a random frequency band offset Kudumakis will frequently use watermark frequency band locations within the following frame that are the same as in the current frame, and due to e.g. echo distortions the watermark information located at such frequency bands in the following frame will not be decodable at receiver side).

Preuss discusses a method to combine modified digital information with an original audio signal to form a composite audio signal which is not readily

distinguishable from the original audio signal by listening. (See Preuss, col. 3, lines 15-30).

However, Preuss, like Kudumakis, also fails to disclose the Claim 1 aspect of “wherein, in the frame following said current frame, no watermark signal carrier is transmitted in the frequency band or bands which have been occupied in said current frame, in order to decrease watermark data bit errors caused by echoes following reception of said audio signal”. Applicant notes that independent Claims 2, 5, and 6 likewise contain the above-mentioned distinctive aspect in Claim 1.

Thus, Applicant respectfully submits that the combination of Kudumakis and Preuss fails to teach to suggest the aspect of excluding a transmission in a frame following a current frame of a watermark signal carrier in the frequency band or bands which have been occupied in said current frame, in order to decrease watermark data bit errors caused by echoes following reception of said audio signal as recited in pending independent Claims 1, 2, 5, and 6. As a result, the combination of Kudumakis and Preuss fails to establish a prima facie case of obviousness under 35 USC §103 under MPEP §2143 because their combination fails to disclose all of the elements of the pending claims. Also, since Claims 9 and 10 depends on patentably distinct Claims 1 and 5 respectively, then dependent Claims 9 and 10 are likewise patentably distinct over the combined cited art per MPEP §2143.03.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 35 U.S.C. §103 rejection of pending Claims 1, 2, 5, 6, 9, and 10.

Claims 3-4, and 7-8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2003/0169804 to Kudumakis et al. (Kudumakis) in view of U.S. Patent No. 5,319,735 to Preuss et al. (Preuss) and in further view of an article by LoboGuerrero entitled “Iterative Informed Audio Hiding Scheme Using Optimal Filter”. Applicant respectfully traverses the rejection.

The teachings of Kudumakis and Preuss are discussed above. LoboGuerrero discusses an informed embedding scheme for audio data using an optimal filter. Yet, like the combination of Kudumakis and Preuss, LoboGuerrero

fails to disclose the aspect that in the frame following a current frame, no watermark signal carrier is transmitted in the frequency band or bands which have been occupied in said current frame, in order to decrease watermark data bit errors caused by echoes following reception of said audio signal".

As a result, the combination of Kudumakis, Preuss, and LoboGuerrero fails to form a prima facie case of obviousness under 35 USC §103 under MPEP §2143 because their combination fails to disclose all of the elements of the pending claims.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 35 U.S.C. §103 rejection of pending Claims 3-4 and 7-8.

Conclusion

Applicant respectfully submits that the amended pending claims patentably define over the cited art and respectfully requests reconsideration and withdrawal of all rejections of the pending claims based on the amendments and arguments above.

If there are any additional charges in connection with this requested amendment, the Examiner is authorized to charge Deposit Account No. 07-0832 therefore.

Respectfully submitted,
Baum, et al.

Date: March 9, 2010

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